學術論文寫作

謝明村
彭文煌 吳啟瑞 陳運捷
中國醫藥大學 中國藥學暨中藥資源學系

一、學術論文的特性

1. 獨創性(originality)：獨創性或創新性為論文的核心。
   1) 新的研究方法(New Method)：研究材料雖不新，但研究方法卻創新。
   2) 新的研究材料創新(New Material)：研究方法雖不新，但研究材料卻創新。
   3) 新的研究想法(解釋)創新(New Idea)：研究方法及材料雖不新，但以新的研究想法得到新的解釋(Explanation)。

一、學術論文的特性

2. 準確性(Accuracy)：研究數據及論文內容不得有誤記。
3. 客觀性(Objectivity)：
   1) 論文必須以客觀立場敘述研究結果，不得存有主觀性(Subjectivity)之推論。
   2) 在討論時應避免「著者確信為如此」等主觀言論。
   3) 應充分顯示引用他人資料或研究成果。

一、學術論文的特性

4. 不偏性(Impartiality)：著者必須以大公無私的立場，不要固執己見，應以發現真理為目標。
5. 確認性(Verifiability)：論文的數據結果需別人能夠以同一方式進行確認及證明。也可叫做再現性(Reproducibility)。
6. 可讀性(Readability)：撰寫論文時，需要站在讀者的立場，使用更簡潔的文字，更明確的表示出論文的獨創性。

二、學術論文的定義

1. 一篇原始創作的學術論文是指：
   1) 確定其觀察。
   2) 重複其實驗。
   3) 評斷其推論。

二、學術論文的定義

2. 研究者必須在論文中說明的5W：
   1) WHY：做此研究的目的為何？想解決什麼問題(包括回顧前人對相似問題的探討)。
   2) WHAT：用什麼方法解決問題？
   3) WHAT：得到什麼結果？
   4) WHAT：發現什麼顯著意義？
   5) WHAT：結論是什麼？

三、學術論文的格式

- 論文題目
- 著者姓名
- 服務機關名稱
- 摘要
- 關鍵詞
- 緒言
- 材料及方法
- 結果
- 討論
- 誌謝
- 參考文獻

三、學術論文的格式

1. 論文題目(Title)
   1) 論文題目應具備簡潔、明確、具體。實驗完成，最後才決定論文題目。
   2) 學術界可能認為不加「研究」二字，會使論文不夠學術份量，舉例如下。
      ① 天麻之藥理學研究
      ② 天麻對學習記憶之研究
      ③ Gasrtodin and p-hydroxybenzyl alcohol facilitate memory consolidation and retrieval, but not acquisition, on the passive avoidance task in rats.

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Gastrodin and *p*-hydroxybenzyl alcohol facilitate memory consolidation and retrieval, but not acquisition, on the passive avoidance task in rats

Ming-Tsuen Hsieh [a,*], Chi-Rei Wu [a], Chieh-Fu Chen [b]

[a] *Institute of Chinese Pharmaceutical Sciences, China Medical College, 91, Hsueh Shih Road, Taichung, Taiwan, ROC*
[b] *National Research Institute of Chinese Medicine, Taipei, Taiwan, ROC*

三、學術論文的格式

1. 論文題目(Title)

④ 中文題目：大豆食物對乳癌賀爾蒙療法的影響

⑤ 英文題目:Study of the effect of Soy-Based food on hormone therapy for breast cancer.

論文題目(Title) 之範例

1. Ameliorating effect of p-hydroxybenzyl alcohol on cycloheximide-induced impairment of passive avoidance response in rats: Interactions with compounds acting at 5-HT1A and 5-HT2 receptors

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Ameliorating Effect of *p*-Hydroxybenzyl Alcohol on Cycloheximide-Induced Impairment of Passive Avoidance Response in Rats: Interactions with Compounds Acting at 5-HT_{1A} and 5-HT_2 Receptors

MING T. HSIEH,* CHI R. WU* AND CHIA C. HSIEH†

*Institute of Chinese Pharmaceutical Sciences, China Medical College, 91, Hsueh Shih Road, Taichung, Taiwan, Republic of China,
†Department of Pediatrics, Veterans General Hospital, Taipei, Taipei, Taiwan, Republic of China

三、學術論文的格式

2. 關鍵詞(Key words)
   1) 關鍵詞通常自題目內選出，但有些論文將選擇範圍擴大，自摘要內選出。
   2) 只要將關鍵文句輸入搜尋引擎，便可在龐大的文獻資料庫內選出所需的參考文獻，節省尋找文獻的時間。

三、學術論文的格式

論文題目：Ameliorating effect of p-hydroxybenzyl alcohol on cycloheximide induced impairment of passive avoidance response in rats; interactions with compounds activity at $5HT_{1A}$ and $5HT_2$ receptors

關鍵詞：p-hydroxybenzyl alcohol; cycloheximide; cholinergic receptor; serotonergic receptor; passive avoidance task; piracetam.

Gastrodin and *p*-hydroxybenzyl alcohol facilitate memory consolidation and retrieval, but not acquisition, on the passive avoidance task in rats

Ming-Tsuen Hsieh [a,*], Chi-Rei Wu [a], Chieh-Fu Chen [b]

[a] *Institute of Chinese Pharmaceutical Sciences, China Medical College, 91, Hsueh Shih Road, Taichung, Taiwan, ROC*
[b] *National Research Institute of Chinese Medicine, Taipei, Taiwan, ROC*

Keywords: Gastrodin; *p*-Hydroxybenzyl alcohol; Learning and memory processes; Passive avoidance

Ameliorating Effect of *p*-Hydroxybenzyl Alcohol on Cycloheximide-Induced Impairment of Passive Avoidance Response in Rats: Interactions with Compounds Acting at 5-HT_{1A} and 5-HT_2 Receptors

MING T. HSIEH,* CHI R. WU* AND CHIA C. HSIEH†

*Institute of Chinese Pharmaceutical Sciences, China Medical College, 91, Hsueh Shih Road, Taichung, Taiwan, Republic of China,
†Department of Pediatrics, Veterans General Hospital, Taipei, Taipei, Taiwan, Republic of China

p-Hydroxybenzyl alcohol Cycloheximide Cholinergic receptor Serotonergic receptor
Passive avoidance task Piracetam

三、學術論文的格式

3. 摘要(Abstract)

- 摘要雖位於論文的最前面，但通常是論文完稿之後才撰寫。
- 摘要一般不分段，長度字數也有限制(150-300字)。
- 摘要是論文的縮影，具體而重點的呈現整篇論文的精髓。
- 正文內容未提到的不可放進摘要。
- 摘要中不要用縮寫字。

三、學術論文的格式

3. 摘要(Abstract)

- 在摘要中用過的縮寫在論文中首次出現時，仍需再重新定義。
- 在論文中出現不超過兩三次的字不必縮寫。
- 摘要在論文中的地位極為重要，初學者會感覺不容易敘述。
- 摘要是讓讀者瞭解這篇論文的目的、方法、結果及結論。
- 摘要是以最精簡的文字讓讀者了解本文的5W：研究目的(WHY)、研究方法(WHAT)、研究結果(WHAT)、研究結果的意義(WHAT)、研究結論(WHAT)。

三、學術論文的格式

3. 摘要(Abstract)

- 摘要內容：

1) 研究目的
   ① 說明研究目的及範圍，或其理由。
   ② 不要引用其他文獻，以說明本研究之目的。
2) 研究方法
   ① 敘述簡潔，不要過分詳細，以能使讀者瞭解本研究採用何種方法為度。
   ② 若使用新方法時，應明確說明其基本原理，適用範圍及精確度。

三、學術論文的格式

3. 摘要(Abstract)

- 摘要內容：

3) 研究結果及結論

① 依方法對特定對象施行試驗而得的成績，謂之結果。

② 依結果歸納成一般的敘述，顯示此論文之創新，謂之結論。

③ 結果及結論應明確敘述，可合併撰寫，以免重複。

④ 試驗結果所獲得的成績即事實(Fact)，與推測(Conjecture)應辨別清楚，不能混淆。

⑤ 結果的敘述應盡量簡明及具體。

⑥ 根據試驗結果得到的新發現，或與前人試驗有所不同，或著者認為能解釋有關難題的發現等；由這些結果的精確度及可靠性所導出的敘述即為本論文之結論。

三、學術論文的格式

3. 摘要(Abstract)

- 摘要內容：

4) 書寫摘要時，應注意下列各要點：
   ① 文句要完整，每句中需要有主詞(Subject)及動詞、受詞等基本要件。
   ② 不能使用讓讀者誤解或難懂的簡縮字、術語、名詞或代號。
   ③ 摘要內不應記載圖表號碼，參考文獻引用號碼。
   ④ 摘要內不用註腳。
   ⑤ 摘要不應用表格、公式、化學構造式及圖解等非文字的資料。

HSIEH, M. T., C. R. WU AND C. C. HSIEH. *Ameliorating effect of* p*-hydroxybenzyl alcohol on cycloheximide-induced impairment of passive avoidance response in rats: Interactions with compounds acting at 5-HT_{1A} and 5-HT_2 receptors*. PHARMACOL BIOCHEM BEHAV **60**(2)337–343, 1998.—The effect of *p*-hydroxybenzyl alcohol (HBA) on cycloheximide (CXM)-induced impairment in the step-through passive avoidance task was investigated in rats and compared to the effect of the nootropic piracetam. HBA and piracetam significantly counteracted the CXM-induced shortening of retention latencies. The effect of HBA was a bell-shaped dose–response curve with a maximal effect of 5 mg/kg. The counteractive effect of HBA was not depressed by either scopolamine or mecamylamine. The serotonin (5-HT) releaser, *p*-chloroamphetamine, and presursor, 5-hydroxytryptophan, significantly antagonized the counteractive effect of HBA on the CXM-induced shortening of retention latencies. Furthermore, the counteractive effect was also inhibited by the 5-HT_{1A} receptor agonist 8-hydroxy-2-(di-n-propylamino)tetralin (8-OH-DPAT) and the 5-HT_2 receptor agoinst 1-(2,5-dimethoxy-4-iodophenyl)-2 aminopropane [(±)-DOI], but potentiated by the 5-HT_1 receptor antagonist (±)-pindolol and the 5-HT_2 receptor antagonist ritanserin. There results suggest that the beneficial effect of HBA on CXM-induced impairment is amplified by treatment with serotonergic receptor antagonists but reduced by serotonergic 5-HT_{1A} and 5-HT_2 receptor agonists, and insensitive to cholinergic manipulations. © 1998 Elsevier Science Inc.

論文摘要之範例

1. The effect of p-hydroxybenzyl alcohol (HBA) on cycloheximide (CXM)-induced impairment in the step-through passive avoidance task was investigated in rats and compared to the effect of the nootropic piracetam.
2. HBA and piracetam significantly counteracted the CXM-induced shortening of retention latencies. The effect of HBA was a bell-shaped dose-response curve with a maximal effect at 5 mg/kg.
3. The counteractive effect of HBA was not depressed by either scopolamine or mecamylamine. The serotonin (5-HT) releaser, p-chloroamphetamine, and precursor, 5-hydroxytryptopan significantly antagonized the counteractive effect of HBA on the CXM-induced shortening of retention latencies. Furthermore, the counteractive effect was also inhibited by the 5-HT1A receptor agonist 8-hydroxy-2-(di-n-propylamino)tetralin (8-OH-DPAT) and the 5-HT2 receptor agonist 1-(2,5-dimethoxy-4-iodophenyl)-2 aminopropane (DOI), but potentiated by the 5-HT1 receptor antagonist pindolol and the 5-HT2 receptor antagonist ritanserin.
4. These results suggest that the beneficial effect of HBA on CXM-induced impairment is amplified by treatment with serotonergic receptor antagonists but reduced by serotonergic 5-HT1A and 5-HT2 receptor agonists, and insensitive to cholinergic manipulations.

三、學術論文的格式

4. 緒言(Introduction)
   1) 緒言是一篇論文的頭，即開宗明義。
   2) 好的緒言包括四部分：背景、問題所在、解決方法、論文目的。
   3) 背景說明告訴讀者許多事情，包括一個問題的來龍去脈，但盡量要縮短長度，減少引用的文獻數目；引用文獻要盡量用新近發表、且與論文研究相關者為限。
   4) 緒言要清楚告訴讀者，本文所探討的問題是什麼？及問題所在。這個問題為什麼值得探討？

三、學術論文的格式

4. 緒言(Introduction)
   5) 問題解決的方法，如果使用的方法具有獨特性，應在此強調。
   6) 一般而言，說明背景、問題所在、問題解決方式等，就能幫助讀者瞭解這篇論文研究的目的。
   7) 一般緒言的毛病，不是寫得太多，就是寫得太短太少。或在討論中再重複敘述。
   8) 太多，就是把基本觀念重複過多，把不相關文獻資料牽扯進來。
   9) 太少，可能研究者認定讀者群和作者一樣熟悉該論文的主題。或背景文獻閱讀不足。

三、學術論文的格式

4. 緒言(Introduction)
   10) 大多數的論文是以新的方法或不同的角度來看既有的問題，因此引述別人對類似問題所做的研究是必要的。
   11) 引用別人的研究文獻有一個準則：不可有意的遺漏前人的研究，尤其是自己的研究與其重複或牴觸時，刻意不引用。這是有意違反學術倫理的行為。
   12) 引用文獻的另一個準則：盡量引用最原始者。
   13) 引用文獻時最常犯的一個毛病：遺漏該主題最原始、最具權威性的著作，而引用了後續性的研究文獻。

三、學術論文的格式

4. 緒言(Introduction)
   14) 學術論文常有許多縮寫及專有名詞，第一次出現時必須將全名拼出，或特殊者要加以解說。緒言是最適當的所在地。
   15) 使用縮 寫的原則是：
       ① 只出現兩三次的名詞，不必使用縮寫。
       ② 盡量採取常見的一般用法、用字，不要標新立異。
   16) 任何事情有好的開始就是成功的一半，緒言對論文而言也是一樣的重要。
   17) 緒言最不好寫。在緒言中將背景、問題所在、問題解決的方法及論文的目的陳述清楚，就能大致顯示這個研究的重要性及學術價值。

論文緒言之範例

1. *p*-HYDROXYBENZYL alcohol (HBA) is a phenolic compound and is prepared from phenol and formaldehyde by hydroxymethylation. Early studies pointed out that HBA had sedative and anticonvulsive effects by acting at central GABA receptors (5), and possessed antioxidant and free radical scavenging activity (16). More recently, HBA attenuated the drug-induced acquisition impairment in the passive avoidance task which acted through suppressing the dopaminergic and serotonergic activities (30, 31).

論文緒言之範例

2. In general, memory processes are divided into three stages: learning acquisition, memory consolidation and retrieval. According to biochemical studies, memory consolidation needs the participation of protein, especially new protein transcription and synthesis (8). Thus, protein synthesis inhibitors such as cycloheximide impair memory consolidation in rodents (2, 6). Furthermore, recent studies have pointed out that memory consolidation involves the activation, by neurotransmitters such as acetylcholine, dopamine and serotonin, of receptor-linked enzymes responsible for synthesis of intra- and inter-cellular messages (15). In a series of studies, Nabeshima et al. pointed out that cycloheximide induced memory consolidation deficits mainly via disturbances in the cholinergic system and increased serotonergic activity in experimental animals (21, 22). Therefore, cycloheximide-induced impairment appears to be a useful model for evaluating the mechanisms of the ameliorating drugs on memory consolidation.

論文緒言之範例

3. In the present study, we attempted to clarify the role of the cholinergic and serotonergic neuronal systems on HBA-induced recovery from the cycloheximide-induced impairment in the passive avoidance task. We investigated whether the ameliorating effects of HBA were antagonized by cholinergic receptor antagonists, a serotonergic releaser, precursor and agonists. We also employed the nootropic piracetam as positive control, because it enhances resistance to the learning and memory impairment induced by various drugs and increases the activities of central neurotransmitters such as acetylcholine and the monoamines (9).

三、學術論文的格式

5. 材料與方法(Materials and Methods)

1) 學術論文為何要有材料與方法，主要有兩個理由：
   ① 讓讀者能從中判定論文實驗的可行性及結果的可信性。
   ② 另一方面也讓讀者在必要時可依法重複該實驗，以證明其再現性(reproducibility)。
2) 一般讀者最少人會去細讀材料與方法，因一般所使用的都是常見的方法。但你在寫論文時最好不要照抄。
3) 如你使用了全新的方法，或在原有的方法上做部分的修改，那就要以較多的文字敘述清楚其步驟。

三、學術論文的格式

5. 材料與方法(Materials and Methods)
   4) 至於使用新方法的理由及創新與其他方法的比較，可在討論中詳細說明。
   5) 有不少SCI學術期刊專門發表新技術的論文。這時材料與方法的撰寫就更形重要。但有些論文的審查人及期刊編輯可能不接受你的實驗方法，因而懷疑你的實驗結果，最後拒絕接受你的論文。
   6) 材料的名稱，中藥應使用基原學名，藥材應使用生藥名，西藥使用普遍名或藥典名，盡量避免使用商品名，但如果使用已久，商品名已變成藥典名者除外，例如Aspirin(acetylsalicylic acid)。

三、學術論文的格式

5. 材料與方法(Materials and Methods)
   7) 實驗步驟盡可能清楚簡要的按步驟敘述，但如使用高效液相層析法時，則只需提供變動部分的資料如移動相等，而不用詳細說明整個操作的過程。
   8) 以英文撰寫論文時，要特別注意的是時態(tense)的問題，由於在材料與方法中所述的都是已做完的實驗及已購買的材料，所以都要用過去式。
   9) 總之，在撰寫材料與方法時要特別注意，你是否提供了完成論文中實驗所需的合理及正確的資料，而可以讓別人可以重複此操作。

論文材料與方法之範例

1. *Animals*

   Male Sprague-Dawley rats, weighing 200-250 gm, were housed in groups of six with free access to food (supplied and designed by Fwusow Industry Co. LTD., Taiwan) and water and kept in a regulated environment (23±1 oC), wherein a 12-hr light-dark cycle (light period: 08:00 to 20:00 hr) was maintained.

   The rats were randomly assigned into each group supported the below experiments. The number of subjects in each group was 12 to 18 and is depicted in the figures. Then, the below drugs were administered and the behavioral assays were operated by double-blind method.

論文材料與方法之範例

2. *Step-Through Passive Avoidance Apparatus*

Memory processes including acquisition, consolidation and retrieval were assessed with a step-through passive avoidance task. The step-through passive avoidance task was used to measure the above three stages depending on drug-treated period.

This apparatus was consisted of two compartments having a steel-rod grid floor (36 parallel steel rods, 0.3 cm in diameter set 1.5 cm apart). One of the compartments (48×20×30 cm) was equipped with a 20W lamp located centrally at a height of 30 cm, and the other was dark compartment of same size, connected through a guillotine door (5×5 cm). The dark room was used during the experimental sessions that were conducted between 09:00 and 17:00 hours.

論文材料與方法之範例

3. *Passive Avoidance Behavior with a Brief Shock*

At the beginning of a training trial, the guillotine door connecting the light and dark compartment was closed. After each rat was placed in the light compartment with its back to the guillotine door, the door was opened and simultaneously the time (step-through latency, STL) taken by the rat to enter the dark compartment was measured with a stopwatch. Once the rat entered the dark compartment, the door was closed. An inescapable scrambled footshock (1.0 mA for 2 sec) was then delivered through the grid floor by MCU-101 Controller (Muromachi Kikai Co., Tokyo). The rat was removed from the dark compartment 5 sec after administering the shock. The rat was then put back into its home cage until the retention trial, which was carried out 24 hr later. The rat was once again placed in the light compartment and as in the case of the training trial, the guillotine door was opened and the STL was recorded and used as a measure of retention (29). An upper cut-off time of 300 sec was set.

論文材料與方法之範例

4. *Experiment design*

In the first series of experiments, CXM (1.5 mg/kg, s.c.) was administered immediately after the training trial. HBA (0.5, 1, 5, 10 and 25 mg/kg, p.o.) were administered to CXM-treated rats 1hr before the training trial. Piracetam (50, 100 and 300 mg/kg, p.o.) was also administered to CXM-treated rats 1hr before the training trial.

In the second series of experiments, HBA (5 mg/kg, p.o.) was administered to CXM-treated rats 1hr before the training trial. SCOP (0.3 mg/kg, i.p.), MECA (1 mg/kg, i.p.), PCA (1 mg/kg, i.p.), 5-HTP (10 mg/kg, i.p.), PIN (10 mg/kg, i.p.), 8-OH-DPAT (0.025 mg/kg, i.p.), DOI (0.2 mg/kg, i.p.) and RIN (0.25 mg/kg, i.p.) were also given simultaneously with CXM.

論文材料與方法之範例

5. *Motor Activity with Non-Shock Rats*

   To evaluate the effect of various drug combinations on motor activity in passive avoidance task, the same experimental steps were followed as described in the above section with the exception that rats received no footshock during the training period. Twenty-four hours later, the retention trial was also carried out and the STL was recorded (14). The rats were given 1.5 mg/kg CXM in combination with the above mentioned drugs.

論文材料與方法之範例

6. *Pain Threshold to Electric Stimulation*

   The threshold of flinch, jump or vocalization produced by electric shock was measured by using the passive avoidance apparatus. Each rat was placed in the dark compartment of the passive avoidance task apparatus and the shock intensity was manually raised stepwise from 0.5 to 1.0 mA in increments of 0.1 mA until either a flinch, jump or vocalization was observed. Duration of shock was 2 sec and the intershock interval was 15 sec. The point at which the rat exhibited these responses was recorded (28). The rats were orally given doses of 0.5, 1, 5, 10 and 25 mg/kg HBA or 50, 100 and 300 mg/kg piracetam, 1hr before the training trial.

論文材料與方法之範例

7. *Drug Administration*

p-Hydroxybenzyl alcohol (HBA), piracetam, cycloheximide (CXM), scopolamine hydrobromide (SCOP), mecamylamine (MECA), *p*-chloroamphetamine hydrochloride (PCA) and (±)-pindolol (PIN) were all purchased from Sigma Chemical Co. and dissolved in 0.9% saline. 1-(2,5-dimethoxy-4-iodophenyl)-2 aminopropane ((±)-DOI) was purchased from Research Biochemicals Inc. and also dissolved in 0.9% saline. 5-Hydroxytryptophan (5-HTP, Sigma Chemical Co.) was suspended in 0.5% carboxymethylcellulose (CMC, Hwa Hsing Chemical Co. LTD.) in 0.9% saline. 8-Hydroxy-2-(di-n-propylamino) tetralin hydrobromide (8-OH-DPAT, Sigma Chemical Co.) was dissolved in 0.9% saline containing 0.5% ascorbic acid. Ritanserin (RIN, Research Biochemicals Inc.) was dissolved in distilled water along with 3 drops of lactic acid, and sodium bicarbonate was used to adjust the pH of the solution to about 4.

These drugs were administered in a volume of 1 ml/kg body weight. HBA and piracetam were administered p.o. 1 hr before the training trial. CXM (s.c.) and the other above drugs (i.p.) were administered immediately after training to avoid any direct acute effect on behavior in the training or retention trial.

論文材料與方法之範例

8. *Statistics*

Because the data distribution from the passive avoidance task was truncated at 300, non-parametric Kruskal-Wallis analysis followed by two-tailed Mann-Whitney U-tests were used to analyze the data. The U-value was then transformed into a Z-value. In addition, the data collected during motor activity and shock sensitivity was analyzed using a one-way analysis of variance, followed by Duncan‘s multiple range test. The criterion for statistical significance was $P < 0.05$ in all the above statistical evaluations.

三、學術論文的格式

6. 結果(Results)
   1) 結果是告訴讀者，你為什麼(在緒言)及如何(在材料與方法)做了這些實驗之後所得結果，結果是論文最主要的部份。
   2) 不管你的立論多麼可信、多麼創新(New Idea、New Method、New Material)等獨創性(Originality)，假如結果不如預期，一切也是白費工夫。
   3) 研究所得的結果就是據以分析或解釋而建立新結論的依據資料。

三、學術論文的格式

6. 結果(Results)
   4) 論文內的結果，要將實驗的數據除了正確外，還要加以整理並製作統計。
   5) 一般期刊在結果項內僅記載試驗結果，不做廣泛討論，但有期刊將此二項併成「結果及討論」。
   6) 在結果項內不要引用別人的結果，在討論項內則可以引用。
   7) 通常應按實驗的邏輯先在方法項內介紹實驗，接著再在結果展示創新的實驗數據。

三、學術論文的格式

6. 結果(Results)
   8) 有人常犯的毛病是在結果項內介紹實驗時重複太多的實驗細節，展示數據時也鉅細靡遺地列出所有的實驗結果，使結果變成方法的續篇及一群數字的堆積。
   9) 由於論文的目的在展示有意義的新發現，所以在數據展示上必須要有所整理及取捨。
   10) 一張好的圖或表勝過千言萬語的說明，但要遵守的原則是一項數據只能以一張圖或表展示，兩者不可重複出現。

三、學術論文的格式

6. 結果(Results)
   11) 有的研究者習慣在陳述結果的同時就加上結果的涵義說明，這就超過了結果而越入討論的範圍，這是不對的，應該避免。
   12) 大多數的學者都不喜歡負面的結果，因其通常不易單獨發表，但負面結果並不是無用的，不如預期，並非全是白費工夫。
   13) 負面的結果可以免去後人浪費無謂的時間、經費……等研究成本；或本研究只要伴隨一個正面的結果，負面結果就可展示新的意義。
   14) 負面結果可展示出正面結果的創新。

論文結果之範例

1. *Effects of HBA and Piracetam on CXM-Induced Impairment*
   CXM (1.5 mg/kg) injected immediately after the training trial significantly reduced the STL in the retention test (H=19.86, P<0.0001). The effects of pre-training administration of HBA at various doses on CXM-induced shortening of retention latencies are shown in Fig. 1. A Kruskal-Wallis test yielded a significant overall effect of HBA on the decremental effect of CXM (H=33.46, P<0.0001). Further Mann-Whitney U tests indicated that HBA at 1, 5, 10 and 25 mg/kg significantly counteracted CXM-induced shortening of retention latencies (U=51, Z=2.09, P<0.05; U=6, Z=4.18, P<0.001; U=21, Z=3.48, P<0.001; U=44, Z=2.41, P<0.05). The dose effect curve was bell-shaped, with a maximal effect occurring at 5 mg/kg. The nootropic, piracetam at 100 and 300 mg/kg, also significantly counteracted the CXM-induced shortening of retention latencies (U=15, Z=3.0, P<0.01; U=1, Z=3.86, P<0.001) (Fig. 1).

論文結果之範例

2. *Effect of Cholinergic Receptor Antagonists on the Counteractive Effects of HBA on CXM-Induced Impairment*

SCOP, a muscarinic receptor blocker, injected immediately after the training trial at 0.3 mg/kg did not cause memory disruption itself and did not abolish the counteractive effect of HBA at 5.0 mg/kg on CXM-induced impairment of passive avoidance response ($U=77.0$, $Z=0.63$, $P>0.05$) (Fig. 2A). MECA, a nicotinic receptor blocker, injected immediately after the training trial at 1.0 mg/kg also did not cause memory disruption itself and did not abolish the counteractive effect of HBA at 5.0 mg/kg on CXM-induced impairment of passive avoidance response ($U=56.0$, $Z=0.62$, $P>0.05$) (Fig. 2B).

論文結果之範例

3. *Effects of Serotonergic Agonists and Antagonists on the Counteractive Effect of HBA on CXM-Induced Impairment*

   PCA, a 5-HT releaser, injected immediately after the training trial at 1.0 mg/kg did not cause memory disruption itself but markedly antagonized the counteractive effect of HBA at 5.0 mg/kg on CXM-induced impairment of passive avoidance response ($U=17.0$, $Z=3.32$, $P<0.001$) (Fig. 3A). 5-HTP, a precursor of 5-HT, injected immediately after the training trial at 10 mg/kg also did not cause memory disruption itself but markedly antagonized the counteractive effect of HBA at 5.0 mg/kg on CXM-induced impairment of passive avoidance response ($U=39.0$, $Z=2.31$, $P<0.05$) (Fig. 3B).

論文結果之範例

4. *Effects of HBA in Combination with Drugs on CXM-Treated Step Through Latencies in Non-Shocked rats*

   HBA and piracetam had no effect on the STL of non-shocked rats given CXM, except that HBA at 25.0 mg/kg prolonged the STL in the training trial ($P<0.05$) (Table 1). HBA in combination with the above mentioned drugs also had no effect on the STL of non-shocked rats given CXM (Table 2).

論文結果之範例

5. *Pain Threshold to Electric Stimulation*

   As shown in Table 3, the flinch and vocalization thresholds of HBA at 0.5, 1, 5, 10 and 25 mg/kg were not different from the threshold for vehicle-treated rats ($P>0.05$). Piracetam at 50, 100, 300 mg/kg doses also did not significantly alter flinch and vocalization thresholds in rats ($P>0.05$).

三、學術論文的格式

7. 討論(Discussion)
   1) 討論是對研究結果所具之意義，加以評判或解釋，即研究理論得到新的解釋。
   2) 討論是對緒言項內所述之研究目的、問題所在及問題解決方法，經實驗後獲得之研究結果，加以充分之論述，總結5W。
   3) 如實驗結果有新發現與別人在過去所發表之結果宜互相比較分析，兩者之間有差異。
   4) 討論要論述本研究有何獨特性、正確性、客觀性、不偏性等，本研究發現有何應用價值或對未來的研究有何貢獻。

三、學術論文的格式

7. 討論(Discussion)
   5) 但討論時須合乎邏輯，不得過分誇張，引用別人文獻加入本研究做推論，固然可發揮1+1>2之結論，但與本研究無關者切勿引用，或擴大解釋。免使本研究結論落入空談。
   6) 討論是最難寫的部分，也最不容易寫得好，許多人在討論中又重複了緒言中對研究問題的介紹與實驗結果之敘述。討論不是結果的延長。

三、學術論文的格式

7. 討論(Discussion)
   7) 寫好一篇好的討論必備之精義：
      ① 你的結果有哪些新發現？它們有什麼意義？重要性為何？
      ② 你的結果與別人的發現有什麼相近或不同之處？如藥理作用機轉有何不同之處？要提出討論，不要只列舉相同或不同點。但不能引用別人的發現，你沒有做就拿來推測你的研究結果與依據某人在某期刊發表的結論，作為你研究討論的結論或推論，這是不合理的結論。
      ③ 實驗結果尚不足以支持本研究目的，而引用別人文獻強求解釋，這是討論中常見的毛病。最簡單舉例：人是動物，狗是動物，所以解釋人就是狗！

三、學術論文的格式

7. 討論(Discussion)

   8) 討論時不要貪心的希望一個研究就能解決大問題，要就事論事，切記，結論不要下的太武斷。

   9) 如你覺得實驗結果沒有甚麼可以討論的，那問題可能出在實驗本身設計，了無新意，未能解決問題。

   10) 最後，最重要的是，這篇論文如何讓審稿人、主編同意接受發表。

論文討論之範例

1. In the present study, piracetam and HBA counteracted a CXM-induced shortening of STL in passive avoidance retention, the maximal effect brought about by HBA was close to that produced by piracetam. These results confirm a dose-response analysis of the effect of HBA in a previous study (31).

論文討論之範例

2. Acquisition and performance of the passive avoidance task can be altered by the sensory, motivational or motor effects. However, several aspects argue against the possibility that the passive avoidance response in drug-treated animals can be related to sensitivity to nociceptive stimuli or motor effects during training. Although our previous study indicated that HBA at 25 mg/kg did not alter horizontal activity in rats (31), Huang reported that HBA at 100 mg/kg reduced motor activity in mice (11). Therefore, the behavior observed in the passive avoidance task and the vocalization threshold of rats which received HBA or piracetam were demonstrated. The vocalization threshold of rats which received HBA or piracetam were normal in the training or retention trial, but HBA at 25 mg/kg prolonged the STL in the training trial. It appears from the present results and the previous report (11, 31) that HBA at 25 mg/kg only altered attention in the passive avoidance task but selectively decreased motor activity at 100 mg/kg in the open-field test. The data demonstrated that the beneficial effect of HBA on the CXM-induced impairment in the passive avoidance task was dose dependent. At these doses (1-10 mg/kg), this counteractive effect of HBA was mainly related to memory-related process, but at 25 mg/kg, this counteractive effect of HBA may have been partially attenuated via alteration of exploratory behavior and motor activity during the training trial.

論文討論之範例

3. Several investigators suggested that the cholinergic and serotonergic systems play complementary roles in the passive avoidance procedure and spatial memory paradigms. CXM-induced impairment of passive avoidance response has been found to act through the disturbance in the cholinergic neuronal system and the increase in the serotonergic neuronal system (21). Therefore, we further clarified the role of the cholinergic and serotonergic neuronal system on the HBA-induced recovery from CXM-induced impairment of passive avoidance response.
4. The muscarinic receptor antagonist SCOP and nicotinic receptor antagonist MECA, which the used doses in the present study were below the efficacy dose in cognitive function and consistent with other reports (25, 27), did not shorten the STL of the retention trial by themselves and did not inhibit the counteractive effects of HBA in amnesia. However, the serotonin releaser PCA and precursor 5-HTP, which the used doses in the present study were below the efficacy dose in cognitive function and consistent with other reports (21, 24), did not impair the STL of the retention trial itself but significantly antagonized the counteractive effect of HBA. In fact, there is some evidence in the literature showing that the serotonergic systems play an important role in aversive behavior. The activity of serotonergic systems inhibited the behavioral response in the light-dark test box (4). Therefore, the present data similar to our previous study (31) suggest that HBA could counteract the CXM-induced shortening of retention latency via the serotonergic but not the cholinergic system.

論文討論之範例

4. Furthermore, 5-HT receptors are classified into several subtypes. 5-HT_1 and 5-HT_2 receptor subtypes have been reported to play an important role in learning and memory (17). The increase in serotonergic activity by 5-HT_2 receptors may decrease cholinergic activity and contribute to the CXM-induced impairment of passive avoidance response (21). Furthermore, activation of the serotonergic system by 5-HT_2 receptors inhibits the acetylcholine release in hippocampal slices (20).
5. The counteractive effect of HBA on the CXM-induced impairment of passive avoidance response was significantly antagonized by the $5\text{-HT}_2/5\text{-HT}_{1C}$ receptor agonist DOI and potentiated by the 5-HT_2 receptor antagonist ritanserin, which the used doses in the present study were below the efficacy dose in cognitive function and consistent with other reports (17, 26).
6. Although Nabeshima et al. indicated that 5-HT_{1A} receptors did not participate in the CXM-induced impairment of passive avoidance response (21), 5-HT_{1A} receptors could participate in processing of stress-related information (10) and 5-HT_{1A} receptor agonists could induce the impairment of passive avoidance response via a postsynaptic mechanism (20). We also found that the counteractive effect of HBA was also inhibited by 5-HT_{1A} agonist 8-OH-DPAT and potentiated by 5-HT_1 antagonist (±)-pindolol, which the used doses in the present study were below the efficacy dose in cognitive function and consistent with other reports (1, 26).
7. On the other hand, (±)-pindolol is also a potent b-blocker, but our previous study has indicated that HBA attenuated the PCA-induced acquisition impairment in the passive avoidance task via blocking the serotonergic and a_1 receptors (13). Therefore, it appears that the counteractive effect of HBA on the CXM-induced impairment might act through decreased activity at postsynaptic 5-HT_{1A} and 5-HT_2 receptors.
8. Furthermore, Riekkinen has reported that 5-HT_{1A} and 5-HT_2 receptor agonists impair the passive avoidance response and act through non-cholinergic heteroreceptors (26). Our previous studies pointed out that HBA did not attenuate the SCOP-induced acquisition impairment and the beneficial effects of HBA on the PCA-induced acquisition impairment might act through 5-HT_{1A} and 5-HT_2 receptors (13, 31).
9. From these reports and our present data, this counteractive effect of HBA on the CXM-induced shortening of the retention latency might act through decreased activity at non-cholinergic heteroreceptors, postsynaptic 5-HT_{1A} and 5-HT_2 receptors. Moreover, recent studies pointed out other 5-HT receptor subtypes such as 5-HT_3 and 5-HT_4 receptors also play an important role in learning and memory (3, 7). The role of 5-HT_3 and 5-HT_4 receptors in the counteractive effect of HBA might be further studied.

論文討論之範例

4. Taking all these observations into consideration, it appears that the counteractive effect of HBA on the CXM-induced memory consolidation impairment of passive avoidance response can be amplified by 5-HT_{1A} and 5-HT_2 receptors antagonists but reduced by 5-HT_{1A} and 5-HT_2 receptors agonists, and not sensitive to cholinergic manipulations.
5. On the other hand, Nabeshima et al. pointed out that piracetam-like nootropics could attenuate CXM-induced amnesia by interacting with GABAergic neuronal system and enhancing protein synthesis (23). HBA prevented the DNA degradation (16) and possessed central $GABA_A$ activity (5). Furthermore, our previous study also indicated that HBA could improve the impairment via enhancing protein synthesis (12, 31).
6. Hence the beneficial effect of HBA on the CXM-induced impairment of passive avoidance response might partially due to prevent the CXM-induced blockade on RNA translation. The interaction among serotonergic system, GABAergic system and protein synthesis in the HBA-induced recovery from CXM-induced memory consolidation impairment will be worthy of investigation in the future.

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